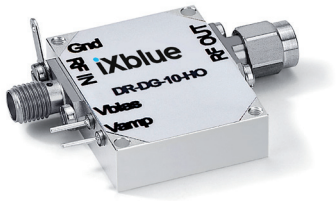
DR-DG-10-HO

12 Gbps High Output Voltage Driver Module

DRIVER



The DR-DG-10-HO is a driver module optimized for digital applications requiring an upper operation voltage at 12.5 Gbps. It exhibits 12.5 V_{pp} output voltage and 35 dB gain up to 7 GHz.

The DR-DG-10-HO module is especially useful for driving $LiNb0_3$ modulators with 12 Gbps DPSK and 2 x 12 Gbps (D)QPSK modulation formats.

It is also a key device for multi-level modulation formats and for driving phase modulators. It is operated from a single power supply voltage for safety and ease of use and offers output voltage control. The DR-DG-10-HO comes with SMA type RF connectors (female in, male out) and with an optionnal heat sink. It is a non-inverting and single ended amplifier.

FEATURES

- High output voltage 12 V_{pp}
- High gain 35 dB
- High SNR
- Single voltage power supply

APPLICATIONS

- $LiNbO_3$ & InP modulators
- 12 Gbps DPSK
- 2x12 Gbps (D)QPSK
- Research & Development

OPTIONS

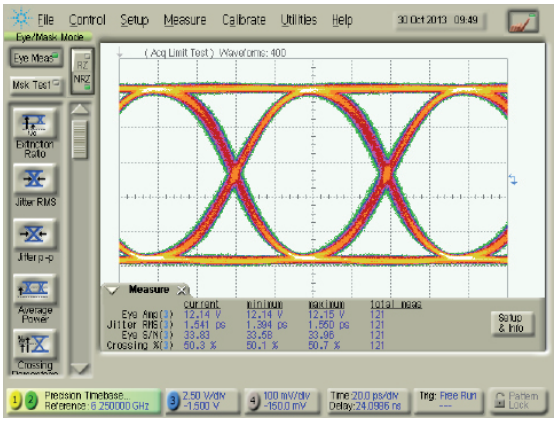
- Heat-sink

Performance Highlights

Parameter	Min	Typ	Max	Unit
Cut-off Frequencies	50 k	-	8 G	Hz
Output Voltage	-	12	-	V_{pp}
Gain	-	30	-	dB
Saturated Power	-	26	-	dBm
Added Jitter	-	1.25	-	ps
Rise / Fall Times	-	24.5	-	ps

Measurements for V_{bias} = 12 V, V_{amp} = 1.2 V, I_{bias} = 420 mA

12.5 Gbps Output Response



DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage (fixed)	V_{bias}	-	12	-	V
Current consumption	I_{bias}	-	0.420	-	A
Gain control voltage	V_{amp}	0	1.4	-	V

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Lower frequency	f_{3db}, lower	-3 dB point	45	50	-	kHz
Upper frequency	f_{3db}, upper	-3 dB point	6	8	-	GHz
Gain	S_{21}	Small signal	-	30	-	dB
Gain ripple	-	< 8 GHz	-	±1.5	-	dB
Input return loss	S_{11}	10 MHz < f < 10 GHz	-	-10	-	dB
Output return loss	S_{22}	10 MHz < f < 10 GHz	-	-10	-	dB
Output voltage	V_{out}	V_{in} = 0.5 V_{pp} @10.7 Gbps	6	12	12.5	V_{pp}
Rise time / Fall time	t_r / t_f	20 % - 80 %	-	24.5 / 24.5	-	ps
Added jitter	J_{RMS}	$J_{RMS} = \sqrt{J^2_{RMS\text{-}total} - J^2_{RMS\text{-}source}}$	-	1.25	-	ps
Power dissipation	P	V_{out} = 12 V_{pp}	-	5	-	W

Conditions: V_{in} = 0.5 V_{pp}, T_{amb} = 25 °C, 50 Ω system

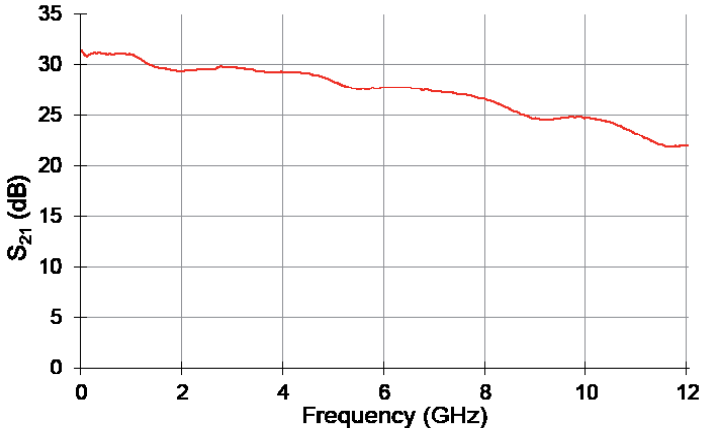
Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
RF input voltage	V_{in}	-	1	V_{pp}
Power Supply Voltage	V_{bias}	11.5	13	V
DC current	I_{bias}	-	0.45	A
Gain control voltage	V_{amp}	0	2	V
Power dissipation	P_{diss}	-	5.8	W
Temperature of operation	T_{op}	-5	+50	°C
Storage temperature	T_{st}	-40	+70	°C

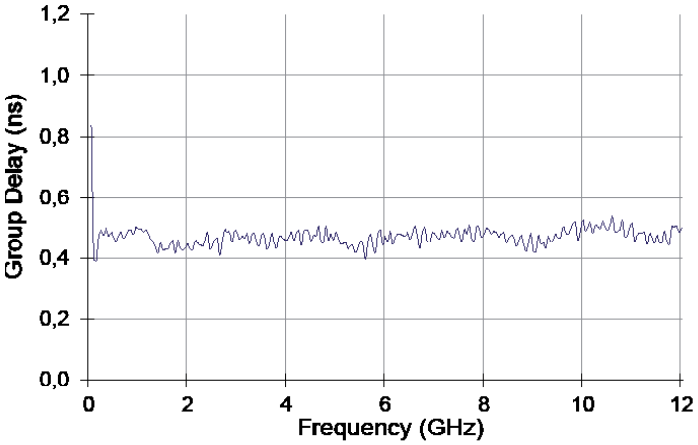
S_{21} Parameter Curve

Conditions: V_{bias} = 12 V, V_{amp} = 0.6 V, I_{bias} = 455 mA



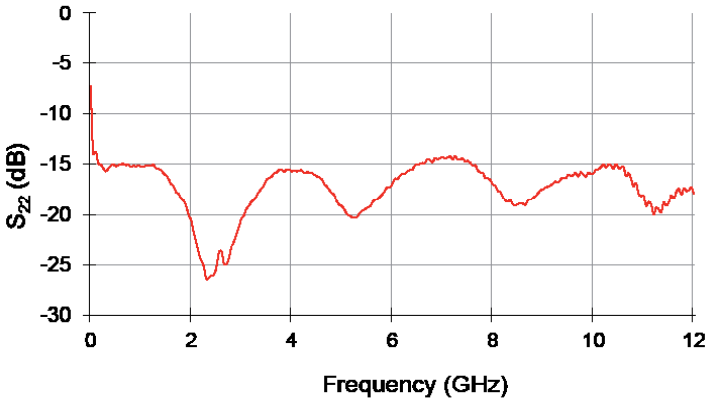
Group Delay Parameter Curve

Conditions: V_{bias} = 12 V, V_{amp} = 0.6 V, I_{bias} = 455 mA



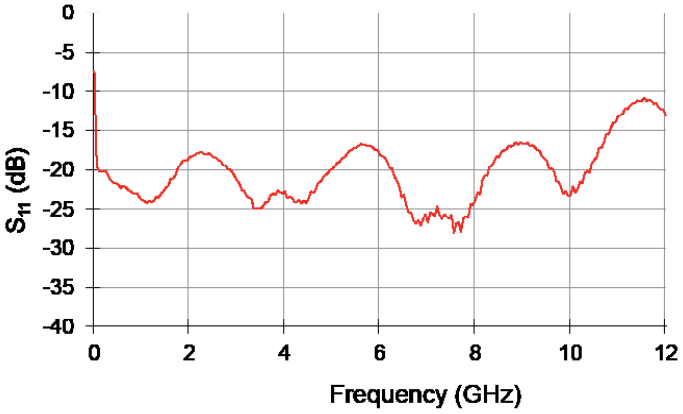
S_{22} Parameter Curve

Conditions: V_{bias} = 12 V, V_{amp} = 0.65 V, V_{xp} = 1 V, I_{bias} = 319 mA



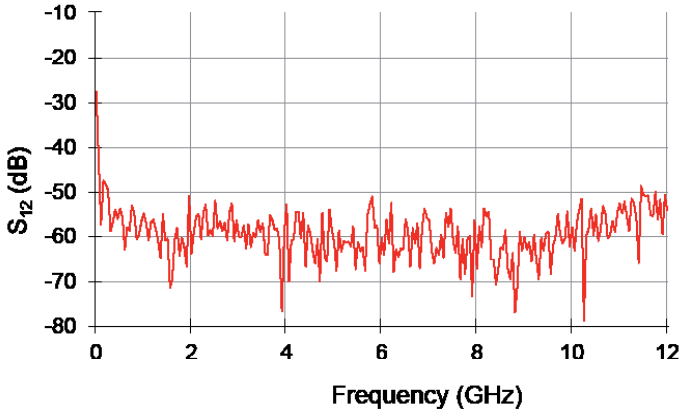
S_{11} Parameter Curve

Conditions: V_{bias} = 12 V, V_{amp} = 0.6 V, I_{bias} = 455 mA



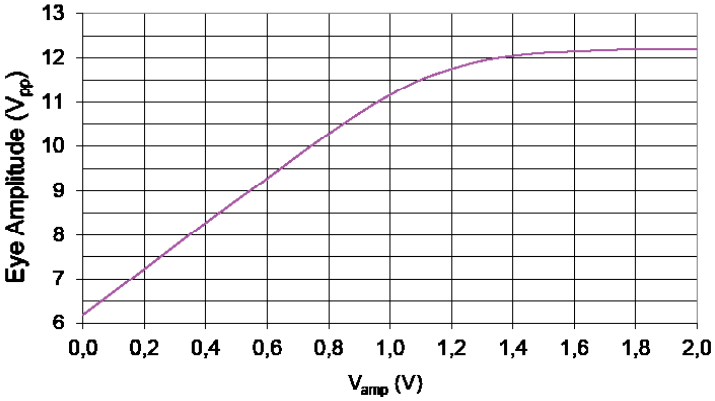
S_{12} Paremeter Curve

Conditions: V_{bias} = 12 V, V_{amp} = 0.6 V, I_{bias} = 455 mA



Typical Output Voltage Amplitude vs V_{amp}

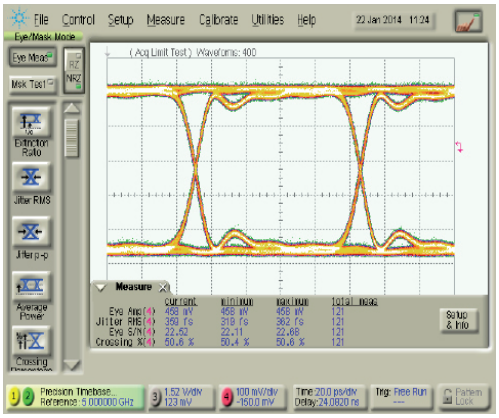
Conditions: V_{bias} = 12 V, V_{amp} = 0.6 V, I_{bias} = 455 mA



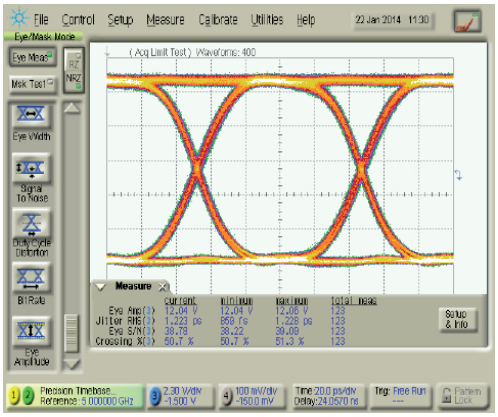
Eye Diagrams

10 Gbps data rate

Conditions: Ratio y, Pattern 2^{31}-1
V_{bias} = 12 V, V_{amp} = 1.35 V, I_{bias} = 379 mA



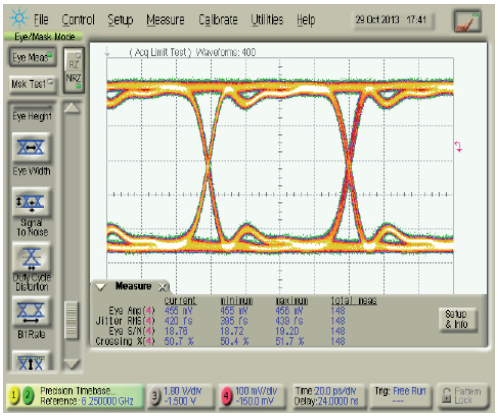
Input signal
Eye amplitude = 0.458 V, Rise time = 10 ps
Jitter RMS = 359 fs, SNR = 22.5



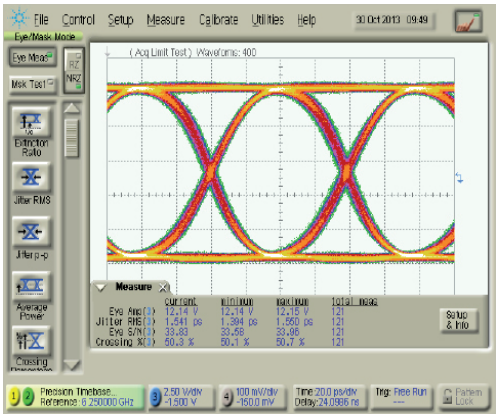
Output response
Eye amplitude = 12 V, Rise time = 26 ps
Jitter RMS = 1.23 ps, SNR = 38.8

12.5 Gbps data rate

Conditions: Ratio y, Pattern 2^{31}-1
V_{bias} = 12 V, V_{amp} = 1.7 V, I_{bias} = 400 mA

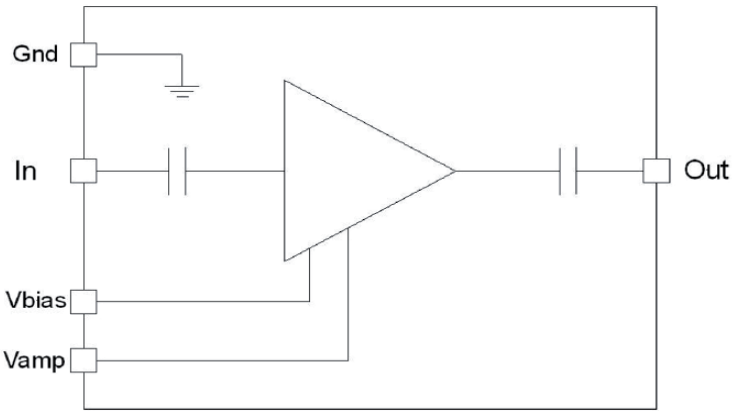


Input signal
Eye amplitude = 0.455 V, Rise time = 10 ps
Jitter RMS = 420 fs, SNR = 18.8



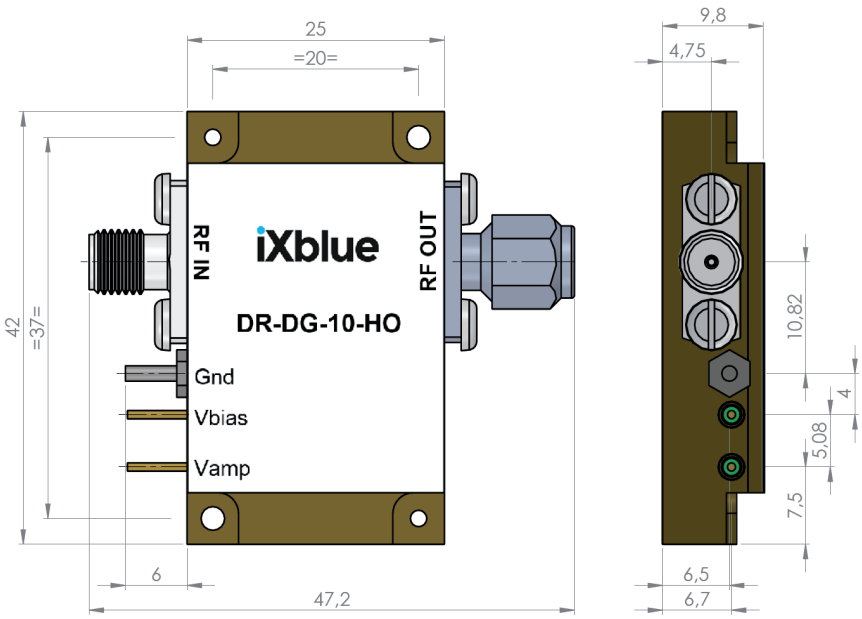
Output response
Eye amplitude = 12.14 V, Rise time = 24.9 ps
Jitter RMS = 1.5 ps, SNR = 33.8

Electrical Schematic Diagram



Mechanical Diagram and Pinout

All measurements in mm

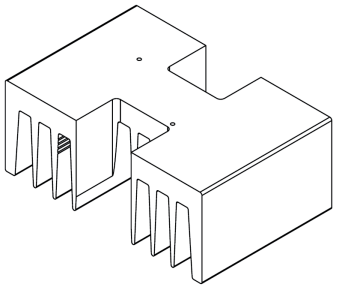


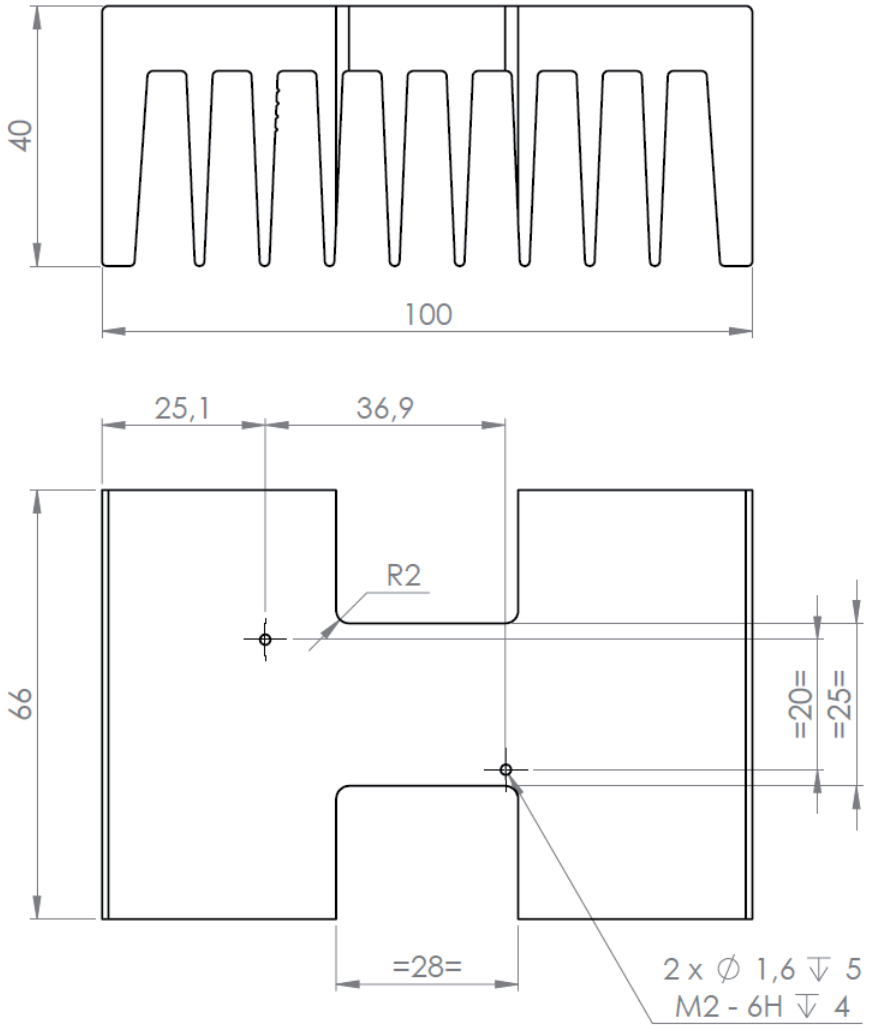
The heatsinking of the module is necessary. It's user responsability to use an adequate heatsink. Refer to page 6 for iXBlue recommended heatsink.

PIN	Function	Unit
IN	RF In	SMA - connector female
OUT	RF Out	SMA - connector male
V_{bias}	Power supply voltage	Set a typical operating specification
V_{amp}	Output voltage amplitude adjustment	Adjust for gain control tuning

Mechanical Diagram And Pinout With HS-HO1 Heatsink

All measurements in mm





About us

iXBlue Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate ($LiNbO_3$) modulators and RF electronic modules.
iXBlue Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.

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